INSTRUCTIONS

CONTROL AND INSTRUMENT SWITCHES

TYPES SB-1, SB-7, AND SB-10

For #1185B1CA7 Switch

MP MASTER
MA32652

GENERAL ELECTRIC
SCHENECTADY, N.Y.

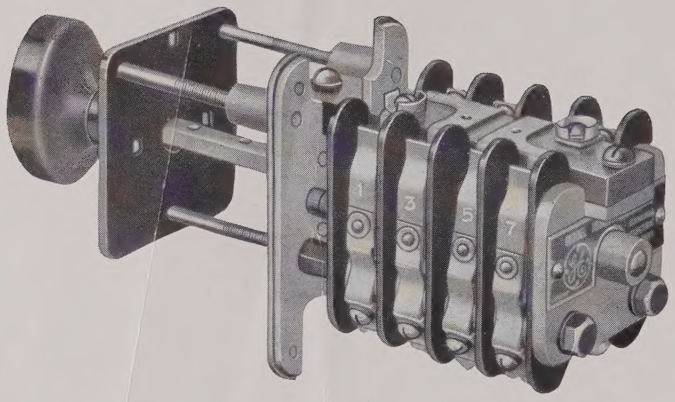


Fig. 1. Type SB-1 Circuit-breaker Control Switch with Cover Removed

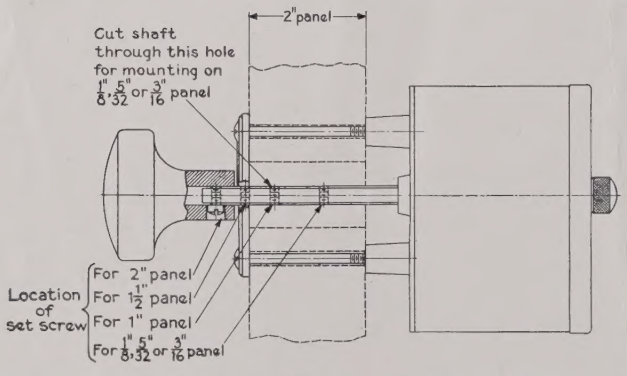

2" panel
Cut shaft through this hole for mounting on 1/8, 5/32 or 3/16 panel
Location of set screw
For 2" panel
For 1 1/2" panel
For 1" panel
For 1/8, 5/32 or 3/16 panel

Fig. 2. Method of Mounting Switch with Fixed Handle

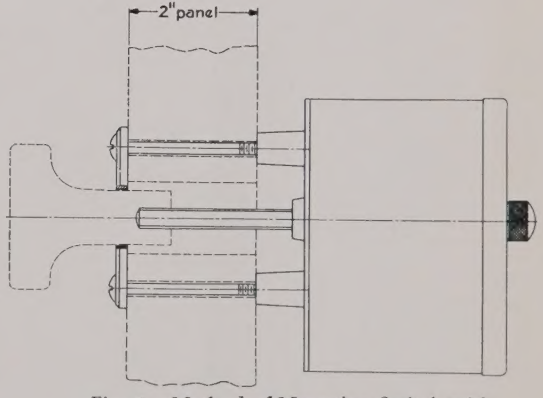


Fig. 3. Method of Mounting Switch with Removable Handle

CONTROL AND INSTRUMENT SWITCHES

TYPES SB-1, SB-7, AND SB-10

The Type SB-1 switches are intended primarily for the control of electrically operated circuit breakers, the control of small motors such as governor motors, rheostat motors, etc., the transfer of meters, instruments and relays connected in secondary circuits, and as auxiliary switches.

The Type SB-7 switches are the same as the Type SB-1 switches except for certain modifications which make them suitable for steel mill applications.

The Type SB-10 switches are the same as the Type SB-1 with pull contacts used in combination with rotary contacts.

SHIPMENT

Switches are packed completely assembled. Two sets of mounting screws are provided—one set for 1½-in. and 2-in. panels and one set for panels 1 in. or less in thickness. Care should be exercised, when unpacking the switches, not to lose the screws.

INSTALLATION

These switches may be mounted on 2-in., 1½-in., 1-in., $\frac{3}{16}$-in., $\frac{5}{32}$-in. or ⅛-in. panels. The shafts are of sufficient length for 2-in. thick panels.

For fixed-handle switches (see Fig. 2), the shaft are provided with tapped holes by which the handle is secured for each thickness of panel. The shafts must be cut when mounting the switch on $\frac{3}{16}$-in., $\frac{5}{32}$-in. or ⅛-in. panel. In the case of the radial die-cast handle, usually used on the governor motor-control switch, it is also necessary to cut the shaft when the switch is mounted on 1-in. thick panels. The cut in this instance is made through the hole for 1½-in. panels.

Removable handle switches are furnished with shafts for specific thickness of panel. If no panel thickness is specified shafts will be furnished for ⅛-in. thick panel.

Fixed-handle switches are provided, when necessary, with a pointer to indicate the position of the switch. This pointer is assembled loose on the shaft between the escutcheon and handle. Between the handle and pointer is a small saddle spring to hold the pointer firmly in place. Care must be exercised not to lose the saddle spring and pointer when removing the handle.

Fig. 4 shows the panel drilling plan.

After entering the mounting screws loosely, the pointer, saddle spring and handle may be attached and the handle used to hold the switch in proper alignment while the mounting screws are tightened.

CONNECTIONS

Refer to Fig. 6–27 inclusive for typical connections.

NUMBERING OF CONTACTS

Fig. 1 shows that the moving contacts are marked with odd numbers on the left- and even numbers on the right-hand side of the switch, back view, starting with the stage next to the panel. If for any reason a contact is omitted, its corresponding number is also omitted; for instance, number 1 is always the left-hand contact of stage 1; if for any reason this contact is omitted, the numbering will start with 2 which will be the right-hand contact of stage 1. With this system of numbering, the contact number also identifies the stage; for instance, contact 9 is the left-hand contact of stage 5, unless, of course, the switch has a special numbering of contacts due to the purchaser's request.

OPERATION

Type SB-1 are nominally rotary switches operated by cams. They may be sustained contact switches with an indent wheel to hold the switch in each position or momentary contact switches with a torsion spring which always returns the switch to a central or neutral position. Spring return switches, furthermore, may have lost-motion cams that close certain contacts in one of the operating positions and hold them closed in the neutral position, until the switch has been turned to the other operating position. Type SB-1 switches may also have pull contacts in combination with the rotary contacts; they are then called Type SB-10 switches. The pull contacts may be opened or closed by pulling the handle in one or more of the turn positions of the switch. These pull contacts may have a retraction spring to return them to the pushed-in position but this retraction spring will not work in conjunction with the torsion spring except in the neutral or normal rotary position.

MAINTENANCE

To remove the moving contact, in case the contacts are burned and need replacement, first remove the screw and clamping washer holding the shunt to the terminal, Fig. 5; then with the contact in the open position, press in on top and pull upwards to remove. The new contact is inserted by entering the end of the moving contact support under the shoe on the moving contact and sliding the contact down until the tongue engages the notch in the support. The shunt is then fastened to the terminal by means of the clamping washer and screw.

Care should be exercised to avoid creasing or kinking the shunt.

If a stationary contact requires replacements, a new contact unit should be installed by means of two round-head screws holding the stationary contact support to the front and rear supports of the switch.

If it is necessary to replace cams, the switch must be disassembled. Before starting, secure a drawing of the switch showing the cam arrangement. First remove the handle; then the fixed contact support; then loosen the tie rods through the switch but do not remove them. Slip the front support off the shaft, being careful not to pull the shaft out of the cams. Stand the switch up on the table, resting on the rear support with the tie rods and shaft extending up. Slide the shaft out just enough to remove the pin through the shaft which seats in the counter bore in the indent wheel or spring stretcher but do not slide the shaft out enough to lose the cams in the last stage. Push the shaft back and slip off the indent wheel or spring stretcher, being careful to hold the shaft in so as not to misplace the cams. The first barrier may now be removed. Before removing the cams, compare their position with the cam arrangement on the drawing and be sure the drawing is understood before proceeding. Each contact stage requires two or three cams depending on whether there are one or two contacts per stage. The cam arrangement is usually shown on the drawing with vertical rows of three cams or two cams and one spacer. Under each vertical row are the contact numbers to which the cams apply. The horizontal rows are lettered A, B, and C. The A cam is the one removed first, working from the front end of the switch, the B cam next and the C cam last. Unless otherwise stated, the position of the cams on the drawing are for the vertical switch position.

Reassemble the switch from the rear support. Put the tie rods through the rear support and place it on the table with the tie rods extending up. Put the shaft in the rear support in an angular position corresponding to the vertical switch position, or to agree with the cam arrangement on the drawing. Assemble the rear barrier and contacts. Place the C cam for the rear contacts on the shaft in the exact position shown in the cam arrangement, next to the B cam and the A cam last. Continue with the next contact stage in the same manner until all the stages are assembled. Assemble the indent wheel or spring stretcher and spring. Slide the shaft out just enough to replace the pin which seats in the counterbore of the indent wheel or spring stretcher. Assemble the front support and if it is a sustained contact switch, be sure the ball and spring which engage the notches in the indent wheel are assembled before pushing the front support home. Tighten the tie rods, first making sure the barriers are all properly nested.

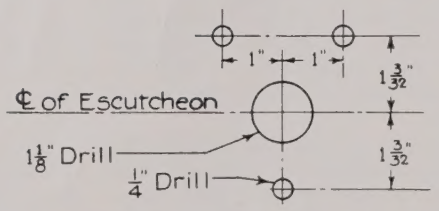


Fig. 4. Panel Drilling (Front View)

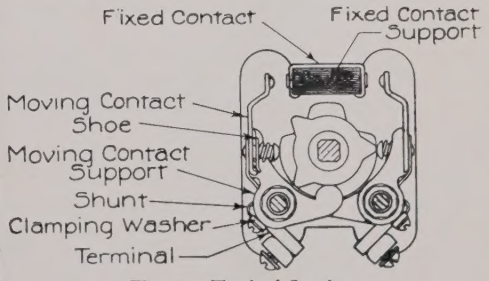
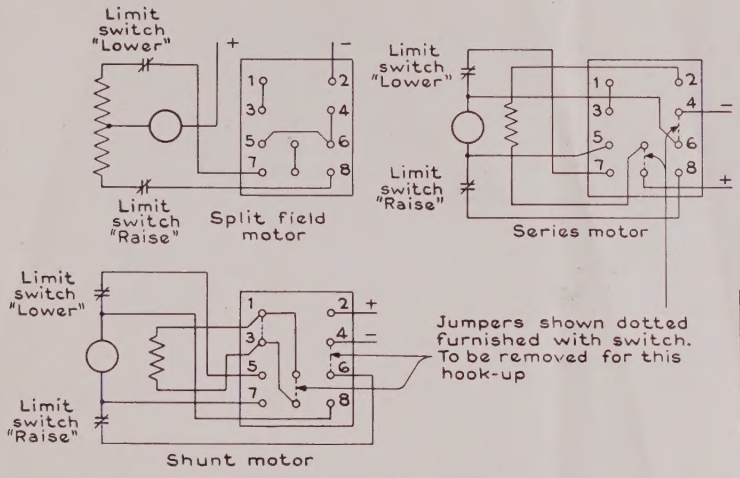


Fig. 5. Typical Section

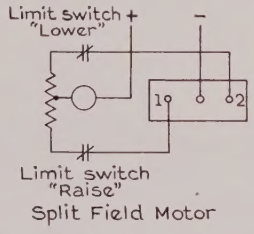
CONNECTION DIAGRAMS—PROGRESSIVE CONTACT POSITIONS



Contacts Handle end		Positions Lower	Normal	Raise
1–2	1	X		X
	2	X		X
3–4	3	X		X
	4	X		X
5–6	5	X		
	6			X
7–8	7	X		
	8			X

Spring return

Fig. 6. Governor or Rheostat Motor Control Switch (Split-field Motors Are Standard for Most Applications)
Model No. 16SB1A1 or 16SB1A2

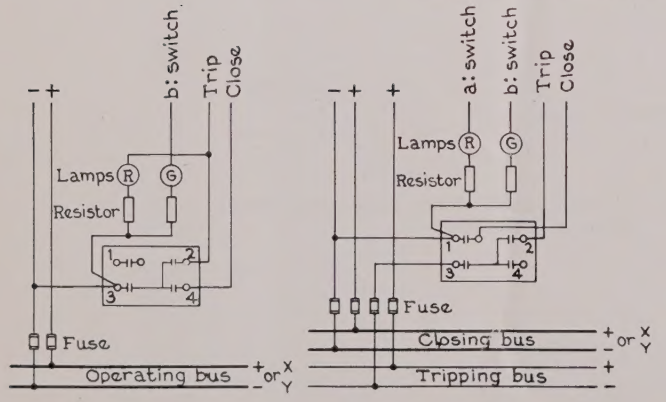


Contacts Handle end		Positions Lower	Normal	Raise
1–2	1			X
	2	X		

Spring return

Fig. 7. Spdt, Single-break Motor Control Switch for Split-field Motors
Model No. 16SB1AA1

Circuit Breaker Control



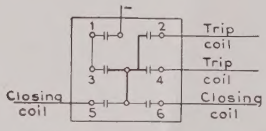
Contacts Handle end		Positions Close	Normal	Trip
1–2	1	X		
	2			X
3–4	3	X		X
	4	X		

Spring return

Contact Position (Back View)

Fig. 8. Circuit Breaker Control Switch (2-stage)
Model No. 16SB1B1

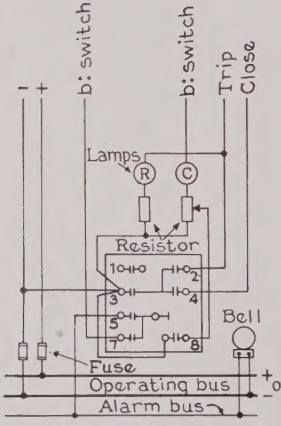
Circuit Breaker Control (Continued)



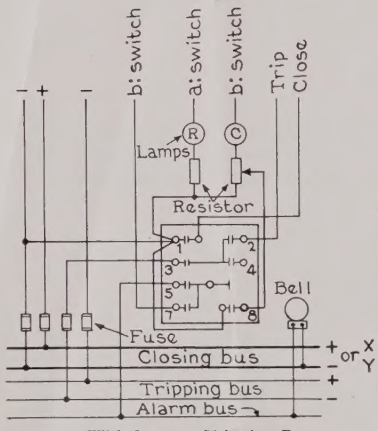
Contacts Handle end		Positions Close	Normal	Trip
1–2	1	x		x
	2			x
3–4	3	x		x
	4			x
5–6	5	x		
	6	x		

Spring return

Fig. 9. Circuit Breaker Control Switch for Operating 2 Breakers
Model No. 16SB1B6



With Single Operating Bus



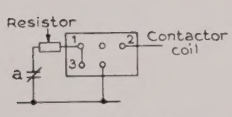
With Separate Tripping Bus

Contacts Handle end		Positions Close	Normal after close	Normal after trip	Trip
1–2	1	x			
	2				x
3–4	3	x			x
	4	x			
5–6	5		x	x	
7–8	7	x	x		
	8	x	x		

Spring return

Contact Position (Back View)

Fig. 10. Circuit Breaker Control Switch (4-stage)
Model No. 16SB1B2

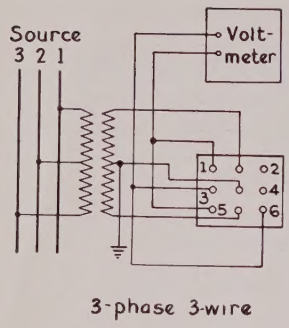


Contacts Handle end		Positions Close	Normal	Trip
1–2	1	x	x	
	2	x	x	
3	3	x		

Spring return

Fig. 11. One Throw Closed—Substitute for Push-button Station
Model No. 16SB1B7

Instrument Switches



Contacts Handle end		Positions 3-1	2-3	1-2	Off
1–2	1	X		X	
	2			X	
3–4	3		X	X	
	4		X		
5–6	5		X		
	6	X			

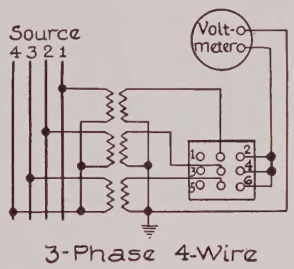
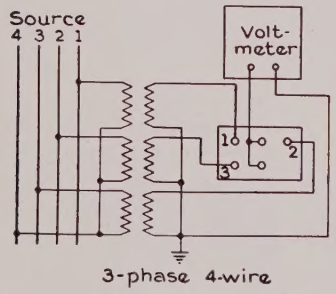
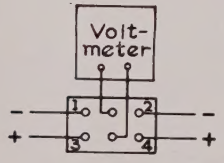


Fig. 12. Voltmeter Transfer, Phase-to-Phase
Model No. 16SB1CF1 or 16SB1CF2



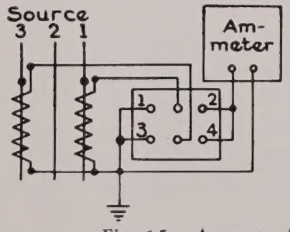
Contacts Handle end		Positions 3	2	1	Off
1–2	1			X	
	2	X			
3	3		X		

Fig. 13. Voltmeter Transfer, Phase-to-Neutral
Model No. 16SB1C6 or 16SB1C7



Contacts Handle end		Positions 2	Off	1
1–2	1	X		
	2			X
3–4	3	X		
	4			X

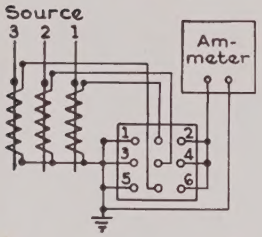
Fig. 14. Voltmeter Transfer, dpdt
Model No. 16SB1CE27



Contacts Handle end		Positions 3	Inter.	2	Inter.	1
1–2	1	X	X			
	2		X	X	X	X
3–4	3				X	X
	4	X	X	X	X	

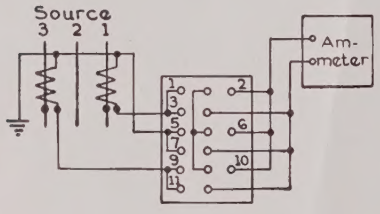
Fig. 15. Ammeter Transfer (Connect at End of Secondary Circuit)
Model No. 16SB1CE25

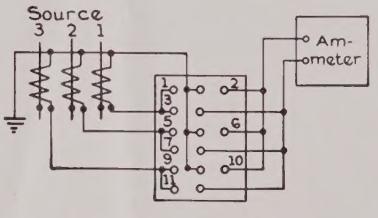
Instrument Switches (Continued)

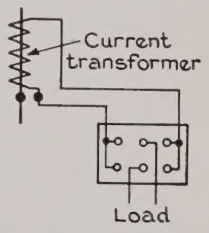


Contacts Handle end		Positions								
		3	Inter.	Inter.	Inter.	2	Inter.	Inter.	Inter.	1
1–2	1	X	X	X	X	X	X	X	X	
	2								X	X
3–4	3	X	X	X	X		X	X	X	X
	4				X	X	X			
5–6	5		X	X	X	X	X	X	X	X
	6	X	X							

Fig. 16. Ammeter Transfer (Connect at End of Secondary Circuit)
Model No. 16SB1CE24





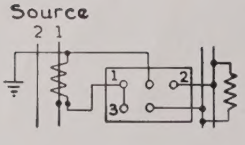


Contacts Handle end		Positions								
		3	Inter.	Inter.	Inter.	2	Inter.	Inter.	Inter.	1
1–2	1	X	X	X	X	X	X	X	X	
	2								X	X
3	3								X	X
5–6	5	X	X	X	X		X	X	X	X
	6				X	X	X			
7	7				X	X	X			
9–10	9		X	X	X	X	X	X	X	X
	10	X	X							
11	11	X	X							

Fig. 17. Ammeter Transfer Switch (Can Be Connected at Any Point of Secondary Circuit)
Model No. 16SB1CA7

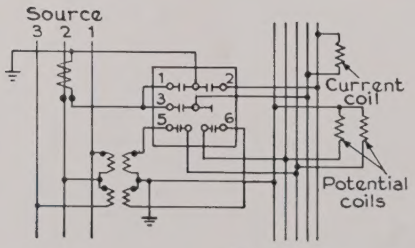
Contacts Handle end		Positions		
		Out	Inter.	In
1–2	1	X	X	
	2		X	X
3–4	3		X	X
	4	X	X	

Fig. 18. Reversing Switch for 1 Current Coil
Model No. 16SB1CE23



Contacts Handle end		Positions		
		On	Inter.	Off
1–2	1		X	X
	2	X	X	
3	3	X	X	

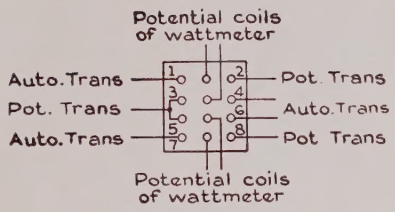
Fig. 19. Power-factor Switch, Current Coil Only
Model No. 16SB1CA8



Contacts Handle end		Positions		
		On	Inter.	Off
1–2	1		X	X
	2	X	X	
3	3	X	X	
5–6	5	X	X	
	6	X	X	

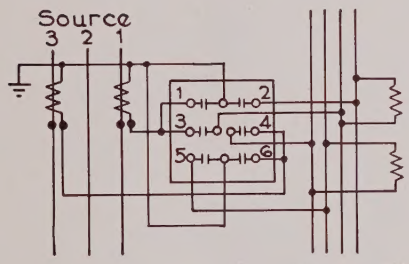
Fig. 20. Power-factor Switch, 1 Current and 2 Potential Coils
Model No. 16SB1CF6

Instrument Switches (Continued)



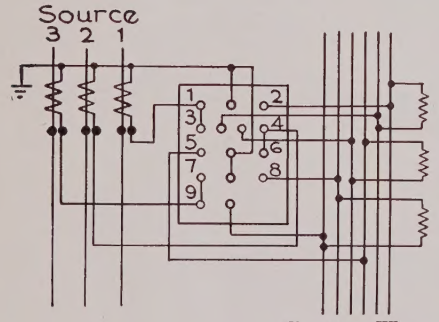
Contacts Handle end		Positions		
		Out	Inter.	In
1–2	1	x		
	2			x
3–4	3			x
	4	x		
5–6	5			x
	6	x		
7–8	7	x		
	8			x

Fig. 21. Power-factor or Wattmeter Reversing Switch
Model No. 16SB1CA10 or 16SB1CB4



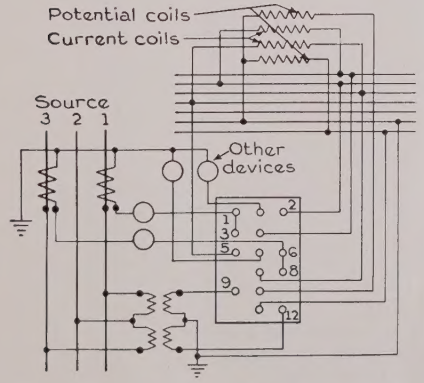
Contacts Handle end		Positions		
		On	Inter.	Off
1–2	1		x	x
	2	x	x	
3–4	3	x	x	
	4	x	x	
5–6	5	x	x	
	6		x	x

Fig. 22. Wattmeter Transfer, 2 Current Coils
Model No. 16SB1CF7



Contacts Handle end		Positions		
		On	Inter.	Off
1–2	1		x	x
	2	x	x	
3–4	3	x	x	
	4	x	x	
5–6	5	x	x	
	6		x	x
7–8	7		x	x
	8	x	x	
9	9	x	x	

Fig. 23. Wattmeter Transfer, 3 Current Coils
Model No. 16SB1CF8

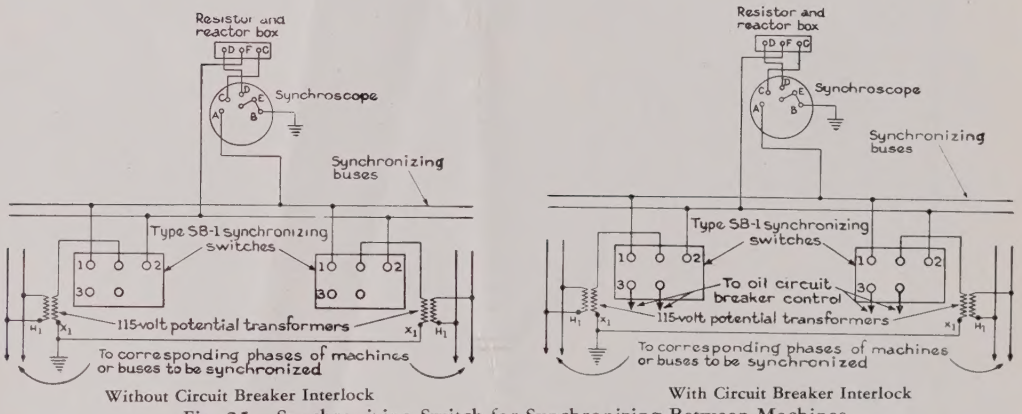


Contacts Handle end		Positions		
		On	Inter.	Off
1–2	1		x	x
	2	x	x	
3	3	x	x	
5–6	5	x	x	
	6		x	x
8	8	x	x	
9	9	x	x	
12	12	x	x	

Fig. 24. Wattmeter Transfer, 2 Current and 2 Potential Coils
Model No. 16SB1CB3

Instrument Switches (Continued)

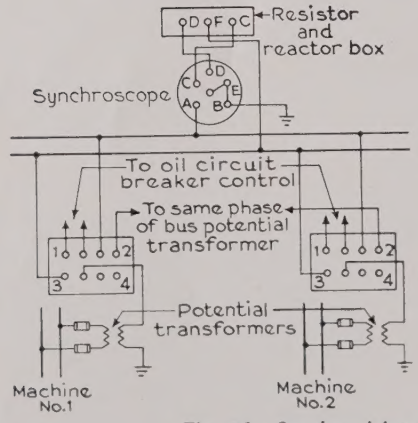
Contacts Handle end		Positions I	Off	R
1 — 2	1			X
	2	X		
3	3	X		


Resistor and reactor box
Synchroscope
Synchronizing buses
Type SB-1 synchronizing switches
115-volt potential transformers
To corresponding phases of machines or buses to be synchronized
To oil circuit breaker control

Without Circuit Breaker Interlock

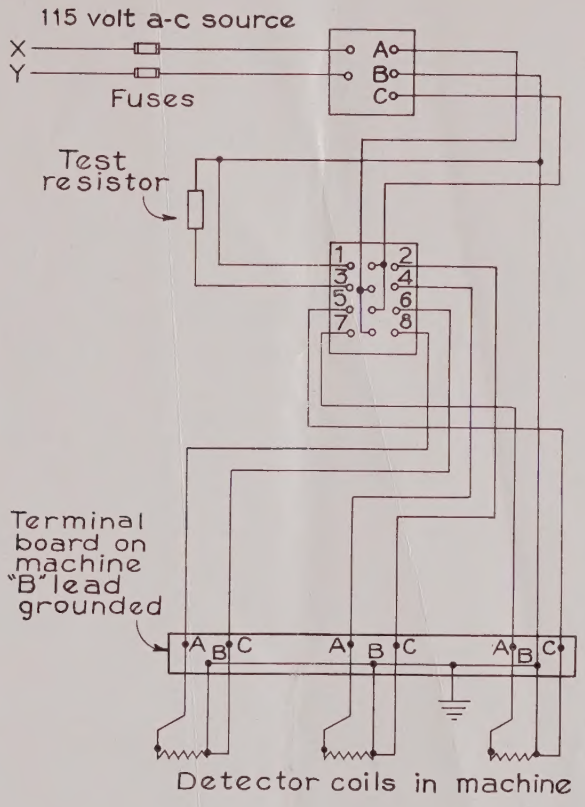
With Circuit Breaker Interlock

Fig. 25. Synchronizing Switch for Synchronizing Between Machines
Model No. 16SB1CB5



Contacts Handle end		Positions On	Off
1 — 2	1	X	
	2	X	
3 — 4	3	X	
	4	X	

Fig. 26. Synchronizing Switch for Synchronizing Between Machines and Bus, with Circuit Breaker Interlock
Model No. 16SB1CF9 or 16SB1CF10



Contacts Handle end		Positions											
		Inter.	Inter.	3	Inter.	Inter.	2	Inter.	Inter.	1	Inter.	Inter.	Test
1 — 2	1												X
	2						X						
3 — 4	3	X										X	X
	4					X	X	X					
5 — 6	5									X			
	6			X									
7 — 8	7								X	X	X		
	8		X	X	X								

Fig. 27. Temperature Meter Transfer
Model No. 16SB1CE28

WHEN SERVICE IS REQUIRED

THE facilities of our engineering departments and factories are available to purchasers of G-E apparatus through G-E service shops and sales offices, a list of which is given below.

When it is necessary to renovate, repair, or change apparatus to meet a new operating condition or a new application, the facilities of the nearest G-E service shop are at your disposal. Each of them is equipped to turn out work of the same high quality, both as to workmanship and materials, as at the factory. If it is necessary that the work be done on the customer's premises, the service shop is prepared to send trained, competent, and dependable men who will do it promptly and efficiently. Similarly, the sales office nearest you will be glad to help you with any engineering problems that may be involved.

SERVICE SHOPS

Atlanta, Ga.	496 Glenn Street, Southwest
Buffalo, N. Y.	318 Urban Street
Charleston, W.Va.	306 MacCorkle Avenue, Southeast
Chicago, Ill.	849 South Clinton Street
Cincinnati, Ohio	215 West Third Street
Cleveland, Ohio	4966 Woodland Avenue
Dallas, Texas	1801 North Lamar Street
Detroit, Mich.	5950 Third Avenue
Houston, Texas	1312 Live Oak Street
Kansas City, Mo.	819 East Nineteenth Street
Los Angeles, Calif.	5203 Santa Fe Avenue
Milwaukee, Wis.	940 West St. Paul Avenue
Minneapolis, Minn.	410 Third Avenue, North
New York, N. Y.	416 West Thirteenth Street
Philadelphia, Pa.	429 North Seventh Street
Pittsburgh, Pa.	6519 Penn Avenue
St. Louis, Mo.	1110 Delmar Boulevard
Salt Lake City, Utah	141 South Third West Street
San Francisco, Calif.	361 Bryant Street
Seattle, Wash.	1508 Fourth Avenue, South
West Lynn, Mass.	920 Western Avenue

Special service divisions are also maintained at the following Works of the Company: Erie, Pa.; Ft. Wayne, Ind.; Pittsfield, Mass.; Schenectady, N. Y.; and West Lynn, Mass. (West Lynn Works)

SALES OFFICES (Address nearest office)

Akron, Ohio	335 South Main Street
Atlanta, Ga.	187 Spring Street, Northwest
Baltimore, Md.	39 West Lexington Street
Bangor, Me.	600 Main Street
Binghamton, N. Y.	19 Chenango Street
Birmingham, Ala.	600 North Eighteenth Street
Bluefield, W. Va.	Appalachian Building
Boston, Mass.	140 Federal Street
Buffalo, N. Y.	1 West Genesee Street
Butte, Mont.	20 West Granite Street
Cedar Rapids, Iowa	203 Second Street, Southeast
Charleston, W. Va.	306 MacCorkle Avenue, Southeast
Charlotte, N. C.	200 South Tryon Street
Chattanooga, Tenn.	832 Georgia Avenue
Chicago, Ill.	840 South Canal Street
Cincinnati, Ohio	215 West Third Street
Cleveland, Ohio	4966 Woodland Avenue
Columbus, Ohio	40 South Third Street
Dallas, Texas	1801 North Lamar Street
Davenport, Iowa	511 Pershing Avenue
Dayton, Ohio	25 North Main Street
Denver, Colo.	650 Seventeenth Street
Des Moines, Iowa	418 West Sixth Avenue
Detroit, Mich.	700 Antoinette Street
Duluth, Minn.	14 West Superior Street
El Paso, Texas	109 North Oregon Street
Erie, Pa.	10 East Twelfth Street
Evansville, Ind.	123 Northwest Fourth Street
Fort Wayne, Ind.	1635 Broadway
Fort Worth, Texas	408 West Seventh Street
Grand Rapids, Mich.	148 Monroe Avenue, Northwest
Hartford, Conn.	410 Asylum Street
Houston, Texas	1312 Live Oak Street
Indianapolis, Ind.	110 North Illinois Street
Jackson, Mich.	212 Michigan Avenue, West
Jacksonville, Fla.	237 West Forsyth Street
Kansas City, Mo.	106 West Fourteenth Street
Knoxville, Tenn.	602 South Gay Street
Los Angeles, Calif.	212 North Vignes Street
Louisville, Ky.	455 South Fourth Street
Memphis, Tenn.	8 North Third Street
Milwaukee, Wis.	940 West St. Paul Avenue
Minneapolis, Minn.	12 South Sixth Street
Nashville, Tenn.	234 Third Avenue, North
Newark, N. J.	744 Broad Street
New Haven, Conn.	129 Church Street
New Orleans, La.	837 Gravier Street
New York, N. Y.	570 Lexington Avenue
Niagara Falls, N. Y.	253 Second Street
Oklahoma City, Okla.	119 North Robinson Street
Omaha, Nebr.	409 South Seventeenth Street
Philadelphia, Pa.	1405 Locust Street
Phoenix, Ariz.	435 West Madison Street
Pittsburgh, Pa.	535 Smithfield Street
Portland, Me.	477 Congress Street
Portland, Ore.	920 Southwest Sixth Avenue
Providence, R. I.	111 Westminster Street
Reading, Pa.	31 North Sixth Street
Richmond, Va.	700 East Franklin Street
Roanoke, Va.	202 South Jefferson Street
Rochester, N. Y.	89 East Avenue
St. Louis, Mo.	112 North Fourth Street
Salt Lake City, Utah	200 South Main Street
San Antonio, Texas	201 Villita Street
San Diego, Calif.	861 West Sixth Street
San Francisco, Calif.	235 Montgomery Street
Schenectady, N. Y.	202 State Street
Seattle, Wash.	821 Second Avenue
Spokane, Wash.	421 Riverside Avenue
Springfield, Ill.	607 East Adams Street
Springfield, Mass.	95 State Street
Syracuse, N. Y.	113 South Salina Street
Tacoma, Wash.	1019 Pacific Avenue
Toledo, Ohio	420 Madison Avenue
Tulsa, Okla.	409 South Boston Street
Utica, N. Y.	258 Genesee Street
Washington, D. C.	806 Fifteenth Street, Northwest
Waterbury, Conn.	95 North Main Street
Wichita, Kan.	200 East First Street
Worcester, Mass.	165 Commercial Street
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